Annual Water Quality Report

NEW HOGAN LAKE

Water Year 2002

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New Hogan Lake

I. Purpose

This report is part of an environmental monitoring program that started at New Hogan Lake in August 1974. The monitoring program was implemented to ensure a continuous level of water quality in the lake for both recreation and environmental health and to satisfy the Department of Army Engineering Regulation 1110-2-8154, "Water Quality and Environmental Management for Corps Civil Works Projects".

II. Brief Description of New Hogan Lake

New Hogan Lake is located in central California, 30 miles east of Stockton, California. Surrounding the lake are the oak and brush covered foothills of the Sierra Nevada Mountains. At capacity the lake has 4,400 surface acres, 50 miles of shoreline, and is nearly 8 miles long. The lake was created by the completion of New Hogan Dam on the Calaveras River in 1964. The structure provides flood damage reduction, water conservation, and hydroelectric power. Since being built for flood control and irrigation, the lake has also become a popular destination for recreation.

Water quality monitoring by the United States Army Corps of Engineers (USACE) began at New Hogan Lake in August 1974. Generally there are two sample events a year, spring (April) and late summer (August). Since the start of the monitoring program, a water quality report is produced yearly to list results and address any concerns of the previous water year.

Generally, New Hogan Lake has a depth of less than 150 feet during the sampling events, and is considered a mesotrophic lake when characterized by its clarity. A mesotrophic lake is one that has physical qualities in between an oligotrophic (clear and nutrient limited; example Lake Tahoe) and an eutrophic lake (low clarity and high in nutrients and biomass; example Clear Lake). New Hogan Lake cannot maintain a dissolved oxygen concentration greater than 5 mg/L in its bottom waters during warm late summer months. Most of New Hogan Lake remains relatively cool (<20ºC) in the late summer. Due to the low dissolved oxygen concentrations in the lake during the late summer, coldwater fish species may have difficulties breeding and surviving in the lake year round. Although clearer than eutrophic (nutrient rich) lakes, mesotrophic lakes can have low water clarity due to algal blooms and suspended sediments in shallow areas. Water clarity is often measured in terms of Secchi Disc depth or SD (Appendix A). Historically, the water clarity in New Hogan Lake is very good with none of the fifty-five sampling event SD values below the recreational goal of 4 feet (Figure 1). In 2001 the Spring SD measure was 17.67 feet and the late summer sample event had a SD of 13.33 feet.

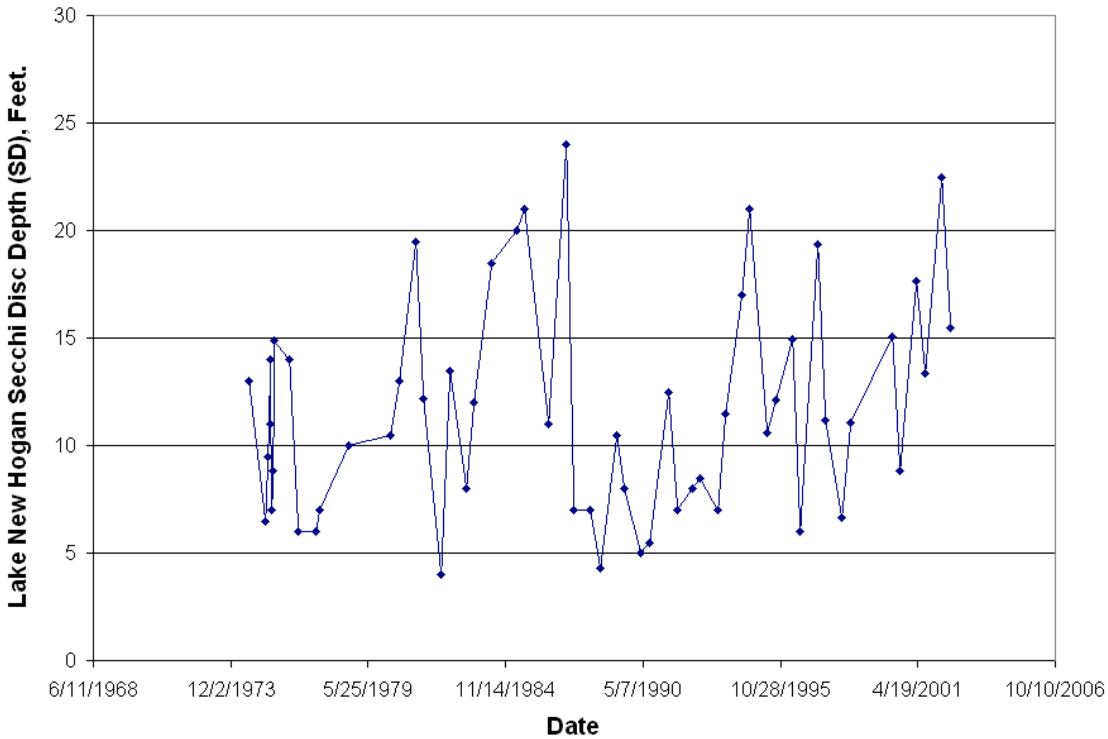

Figure 1. Historical Secchi Depth Values at New Hogan Lake (2002 values included).

The 2001 Water Quality Report listed only mercury in fish tissue as a contaminant of concern at New Hogan Lake. In 2000, the composite fish tissue sample resulted in a concentration of 0.52 ppm, which was below the U.S. FDA fish advisory of 1 ppm, but above the California Office of Environmental Health Hazard Assessment (OEHHA) action level concentration (0.3 ppm Hg) to continue monitoring. In 2001, the concentration of mercury within fish tissue continued to remain high (0.6 ppm).

III. Sample Summaries for this year.

Introduction

The following general summaries are split into their respective sample types. Each type of sample summary includes a discussion of both the spring (April) and late summer (August) samples to better examine trends within the current year. The types of parameters monitored this year include: Secchi Disc depths, water column profiles (temperature, DO and pH), phytoplankton characterization, metals concentrations, MTBE concentrations, Inorganic characterization (alkalinity, phosphorous, nitrogen, etc..), and Fish mercury sampling. For a more detailed explanation of the importance of each type of sample, please see Appendix A.

SECCHI DEPTH

The Secchi Disc depths found during the spring and late summer sampling events were higher than the historical average(historical mean SD = 11.6 feet). More often the clarity is better in the spring than in the late summer, but not always. At the spring sampling event the water clarity was high (Spring 2002 SD = 22.5 feet), which was higher than the previous year (2001 Spring SD = 17.67 feet). The late summer SD of 15.5 feet was above the recreational goal of 4 feet but less than the previous year (Summer 2001 SD = 13.33 feet) (Appendix B).

TEMPERATURE VALUES

The temperature profiles for New Hogan Lake are indicative of a well stratified lake. There is a small depth difference between the spring and late summer sampling events (spring depth = 124.7 feet, late summer depth= 137.6 feet). Due to being stratified, the average temperatures were not very different (spring average temp. = 10.91 ºC, late summer average temp.= 15.87 ºC). New Hogan Lake is able to regulate its temperature due to having a cooler deep-water area throughout the year to buffer it from the warm summer air temperatures. Temperatures in New Hogan Lake should be able to support an ongoing coldwater fish species population. For detailed results obtained during the sampling events, please see Appendix B.

DISSOLVED OXYGEN

The dissolved oxygen (DO) concentration differs greatly from spring to late summer. In the spring DO concentrations are 10.73 mg/L near the surface and 6.6 mg/L at the bottom of the lake. DO concentrations near the surface are above saturation, which is 9.78mg/L at 16.4 º C. The elevated concentration of DO near the surface in the spring was due to photosynthesis occurring in lake phytoplankton. Dissolved oxygen concentrations during the late summer were highest near the surface (DO = 6.44 mg/l) and lowest near the bottom of the lake (DO = 3.25 mg/l). Fish species that require greater than 5 mg/l DO at cooler water temperatures (< 20ºC) may have difficulty thriving year round in New Hogan Lake. For detailed results obtained during the sampling events, please see Appendix B.

PH LEVELS

In the spring and late summer sampling events, pH values in the lake were slightly basic throughout the water column. In the spring sampling event the highest pH was near the surface (Spring 2002 surface pH ~ 7.25) and the lowest was at the bottom (Spring 2002 bottom pH = 7.12) The pH values in the late summer profile varied widely and were slightly more basic. The pH was most basic towards the middle waters (Late Summer 2002 max pH = 8.88) and slightly less basic bottom (Late Summer 2002 pH bottom = 7.43). For detailed results obtained during the sampling events, please see Appendix B.

PHYTOPLANKTON

In the spring sample, the algal biomass within the lake was lower (Biomass = 42.97 ug/L) than spring 2001 (2001 Spring biomass = 263.97 ug/L). In spring 2001 diatoms were the most dominant species, while cryptomonads were most dominant in 2002. In late summer an opposite trend occurred. The phytoplankton population was higher in summer 2002 (2002 Summer Biomass = 750.92 ug/L) than summer 2001 (2001 Summer Biomass = 206.60 ug/L). Diatoms were the most dominant species during both the 2001 and 2002 late summer sampling events. For detailed results obtained during the 2002 sampling events, please see Appendix C.

METALS

None of the dissolved metal samples exceeded the maximum contaminant level (MCL) or the freshwater fishery criteria during the 2002 spring and summer sampling events.

Contaminants will continue to be monitored in the coming year for any changes. For detailed results obtained during the sampling events, please see Appendix D.

MTBE

Concentrations for MTBE at the lake were found to be below the detection limit (< 2 ppb) in the spring and 3 ppb at late summer sampling events. MTBE is not seen as a contaminant of concern in New Hogan Lake at this time. For detailed results obtained during the sampling events, please see Appendix F.

INORGANIC ANALYSIS

The spring and summer sample results were within expected ranges and levels. For detailed results obtained during the 2002 sampling events, please see Appendix E.

FISH TISSUE ANALYSIS

Since only one fish was caught in New Hogan Lake, no composite sample was analyzed. Tissue from a single large mouth bass caught on June 3, 2002 was analyzed for mercury content. The tissue was found to have a mercury concentration of 0.34 ppm, which is above the EPA's action level to continue monitoring. The 2002 single fish concentration was lower than the two previous years composite samples (2001 fish composite mercury = 0.60 ppm, 2000 fish composite mercury = 0.52 ppm).

IV. Conclusions

New Hogan Lake is a mesotrophic lake that can support warmwater fish species. Coldwater fish that require dissolved oxygen concentrations greater than 5 mg/L may have difficulties surviving the late summer conditions at New Hogan Lake.

In the 2002, New Hogan Lake sampling results indicated that there were no high values resulting in contaminants of concern. The mercury concentration of the single fish caught in the lake (in 2002) was lower than previous years, but still above the EPA's action level to continue monitoring. An area that requires improvement is fish sampling so that additional fish will be available for a composite tissue result.

V. References

North American Lake Management Society (1990). *Lake and Reservoir Restoration Guidance Manual*, EPA 440/4-90-006, U.S. Environmental Protection Agency, Washington, DC.

Novotny, V., and H. Olem (1994). *Water Quality: Prevention, Identification, and Management of Diffuse Pollution*, Van Nostrand Reinhold, New York, New York.

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Welch, E.B. (1992) *Ecological Effects of Wastewater: Applied limnology and pollutant effects,* Chapman and Hall, Cambridge University Press, Great Britain.

Wetzel, R.G. (1975). *Limnology*, W.B. Saunders Company, Philadelphia, PA.

VI. Appendices

Appendix A: Glossary of Sample Types

Glossary of Sample Types

This glossary of sample types is intended to provide a general background and indicate the importance of each sample in determining water quality. These are meant to be brief and basic. If a further explanation is desired please refer to the list of references provided in this report.

Secchi Depth

One of the oldest and easiest methods to determine lake clarity is the Secchi depth (SD). The Secchi depth is determined by dropping a Secchi disc into a water body and determining the depth that it is last visible from the surface of the water. Secchi discs are generally white and 20 cm in diameter. Secchi depth values are most impacted by the light intensity at the time of sampling and the scattering of light by solid particulates within the water column. Algal growth (phytoplankton) and sediment re-suspension are often major constituents of solid particulates within the water column. Secchi depth values can be used to estimate the Trophic state or the nutrient levels within the lake. The more nutrients are available, the larger likelihood of algal blooms that limit water clarity. Due to recreational concerns for safety, the goal for Secchi depth values is four feet or greater.

Temperature Profiles and Data Points

The temperature profile of a lake provides information how a lake is operating and the potential for aquatic biota to live within the lake. The temperature profile is a direct indicator if a lake is stratified. Stratification in lakes is created generally by temperature affecting the density of water molecules. Stratification is usually indicated by a region of similar temperature nearer the surface of the water (epilimnion), then a region of temperature transition (metalimnion), to another layer of nearly constant temperature at the bottom of the lake (hypolimnion). Each layer in a stratified lake is important, but the existence of a hypolimnion can drastically impact how well a lake can handle warmer temperatures such as those found in northern California during the summer. The hypolimnion acts as a buffer against large temperature shifts. The nature of dam operation is that water is discharged near the bottom, releasing the hypolimnion, and eliminating stratification. This operation limits the ability of reservoirs to regulate their temperature during the summer months. Stratification isn't always desirable. When a lake isn't stratified and is instead well mixed, the required nutrients near the bottom of the lake become available to phytoplankton for growth. Temperatures within lakes also indicate which species of fish will survive within a lake. Coldwater species of fish require temperatures below 20 degrees C in order to spawn and survive. If a lake is often above 20 degrees C, then only warmwater fish species will survive.

Dissolved Oxygen (DO) Concentration Profiles

DO is required by organisms for respiration and for chemical reactions within lake waters. The recommended level for DO for most aquatic species survival is 5mg/L. In lakes, biota waste (detritus) falls to the bottom of the lake to be utilized by bacteria. The bacteria need oxygen and will deplete levels near the bottom of a lake, especially during warm temperature, high respiration conditions. For nutrient rich (eutrophic) lakes more organisms will grow, create wastes, and cause oxygen depleted regions at the lowest areas. Under these conditions only aquatic species that can survive low DO conditions in warm water near the surface will survive.

PH Profiles

The pH profiles of the lakes indicate the potential for certain chemical reactions to occur. In high pH (greater than pH = 7 or basic) aquatic systems, metal pollutants tend to form into insoluble compounds that fall onto the lake floor. In low pH (less than pH = 7 or acidic) systems or areas metal ions become soluble and available for uptake into aquatic organisms. Other compounds like ammonia that are introduced into a low pH aquatic environment will transform into soluble nitrate and be utilized by organisms.

Phytoplankton Analysis

Phytoplankton analysis indicates the health, nutrients, and biodiversity within a lake. Lakes that have few nutrients available (Oligotrophic) will generally have a much lower quantity of phytoplankton (high Secchi depth) but the number of phytoplankton species seen will be large. In a lake that is nutrient rich (eutrophic) there are generally large phytoplankton blooms (low Secchi depth), but they are made up of a couple of phytoplankton species. Certain species of phytoplankton are preferred food sources for zooplankton (small invertebrates). Generally species like diatoms and green algae can be consumed by the filter-feeding zooplankton, but species like bluegreen algae are low in nutrients and are difficult to consume. Some species like the dinoflagellates can grow horn like points to discourage potential predators. In nutrient rich waters where there is plenty of phosphorous, nitrogen can be limited for biological growth. While most species can't grow due to the lack of nitrogen, bluegreen algae (cyanobacteria) have the ability to utilize nitrogen from the atmosphere when required. This gives bluegreen algae the ability to dominate in many eutrophic lakes.

Soluble Metals Analysis

The soluble metals analysis indicates the exposure of humans and aquatic organisms to toxic metals. These metals often build up as they are consumed through the food chain. Water samples provide an indicator for additional problems. Soluble forms of metal ions are more prevalent in low pH (pH <7, or acidic) environments.

MTBE Analysis

MTBE (methyl tertiary-butyl ether) is a chemical additive to gasoline to improve combustion. Due to its high solubility, MTBE travels and blends into aquatic systems rapidly. While not found to be extremely hazardous at low levels, the offensive smell and taste is detectible by humans at extremely low concentrations. The effect of MTBE on humans and aquatic systems is still under investigation.

Inorganic Analysis

Alkalinity

Alkalinity is measured in terms of mg/L of calcium carbonate. It indicates a lakes ability to buffer incoming acidic pollution and situational changes.

Ammonia

Ammonia is a gas that is toxic to fish and is more visible at a higher pH. Ammonia is created through anthropogenic inputs, bacteria cell respiration, and the decomposition of dead cells. Due to being a gas, given time ammonia will volatilize from the water. At a lower pH, much of the ammonia is converted to ammonium (a nutrient for root bound plant life) and utilizes DO in the nitrification process.

Chloride

The chloride ion is an indicator of any salinity increases within a lake. Most fresh water aquatic species are sensitive to salinity changes.

Nitrate

Nitrate is the nitrogen product created through the nitrification of ammonium. Nitrate is a soluble form of the nutrient nitrogen and is utilized by phytoplankton.

Total Phosphorous

The total phosphorous provides a measure of both utilized and soluble phosphorous within water samples. Phosphorous is a required nutrient for plant growth and development.

Ortho Phosphorous

Ortho phosphorous is the soluble form of phosphorous that is utilized by free-floating aquatic plants (phytoplankton).

Kjeldahl N

Kjeldahl nitrogen or total Kjeldahl nitrogen (TKN) is a measure of the total concentration of nitrogen in a sample. This includes ammonia, ammonium, nitrite, nitrate, nitrogen gas, and nitrogen contained within organisms.

COD

Chemical Oxygen Demand (COD) is a measure of the total oxygen required to complete the chemical and biological demands of a sample.

Fish Tissue Analysis

Fish tissue is analyzed to examine potential exposure of humans to toxicants as well as the health of the aquatic food chain. In aquatic systems toxic contaminants can build up (or bioaccumulate) within animals at the top of the food chain. Contaminants (especially organic pollutants) are retained within the fat tissue of an organism, therefore in fish samples the lipid content is often measured.

Lake Code Designation

Laboratory Reports are provided in the previous sections.

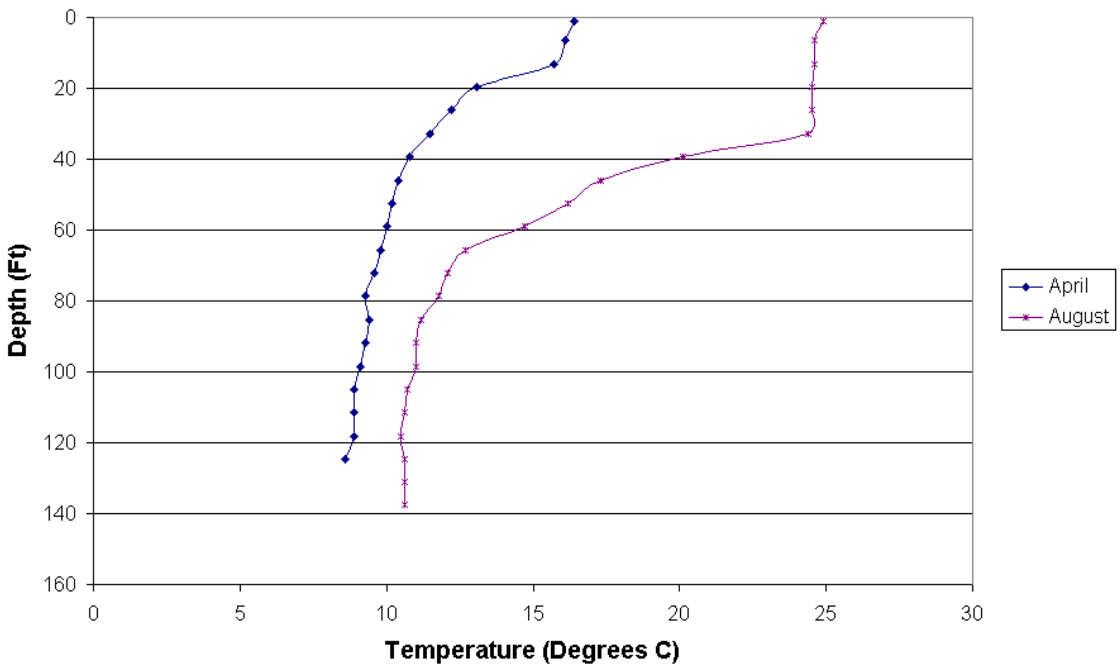
Sample ID is "XX-YY-ZZ" where

XX designation:	YY designation	ZZ designation
BB for Black Butte	SP for Spring	S for surface of Lake
EA for Eastman	SU for Summar	B for bottom of Lake
EN for Englebright		I-1 for inflow1
HE for Hensley		I-2 for inflow 2
IS for Isabella		O for outflow
KA for Kaweah		
ME for Mendocino		
MC for Martis Creek		
NH for New Hogan		
PF for Pine Flat		
SO for Sonoma		
SU for Success		

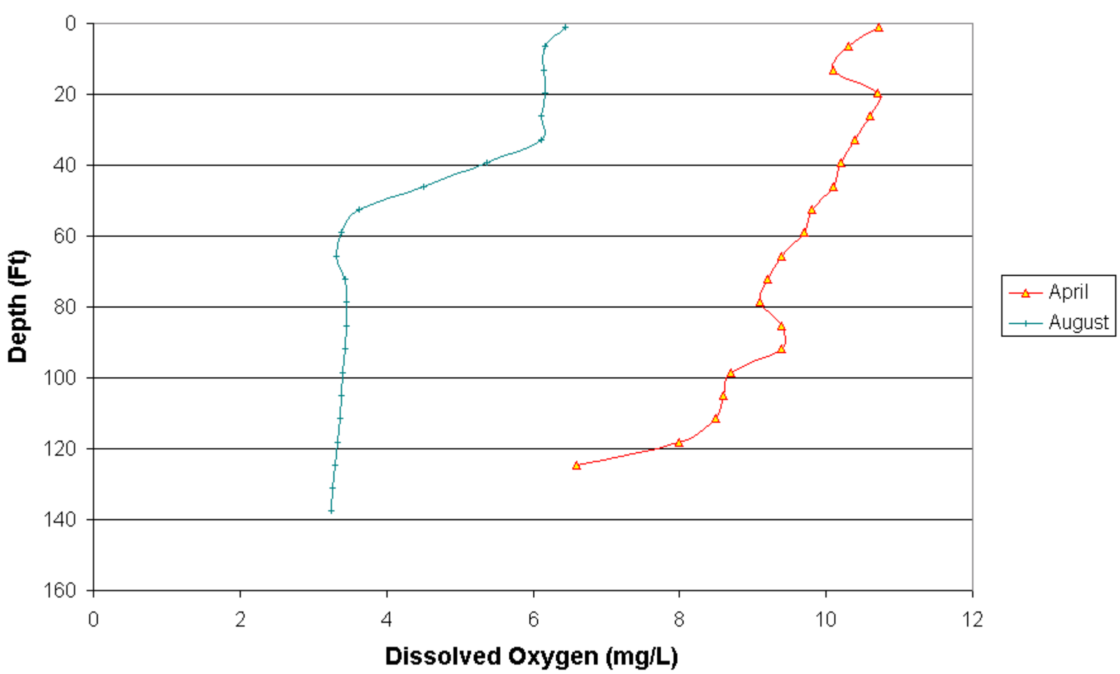
Example: BB-SU-S is for a water sample taken from Black Butte in the Summer on the Lake's Surface.

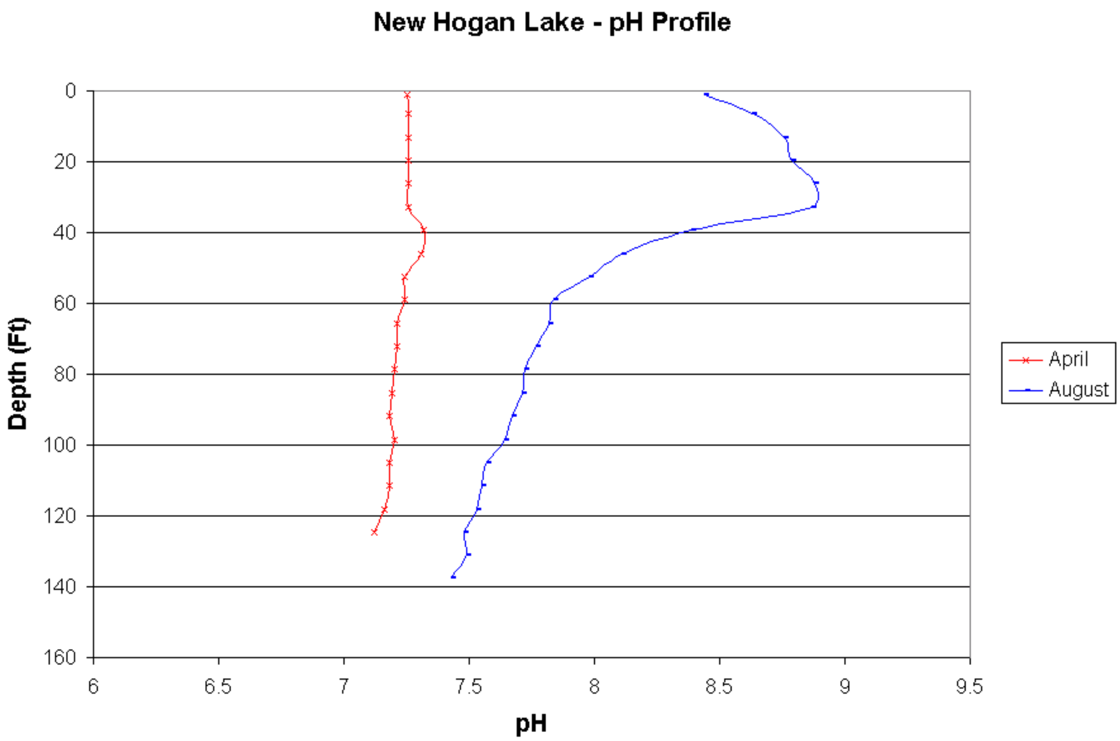
Appendix B: Profile Data and Charts (Secchi Disc, Temperature, DO, and pH)

New Hogan Lake - Temperature Profile



New Hogan Lake - Dissolved Oxygen Profile



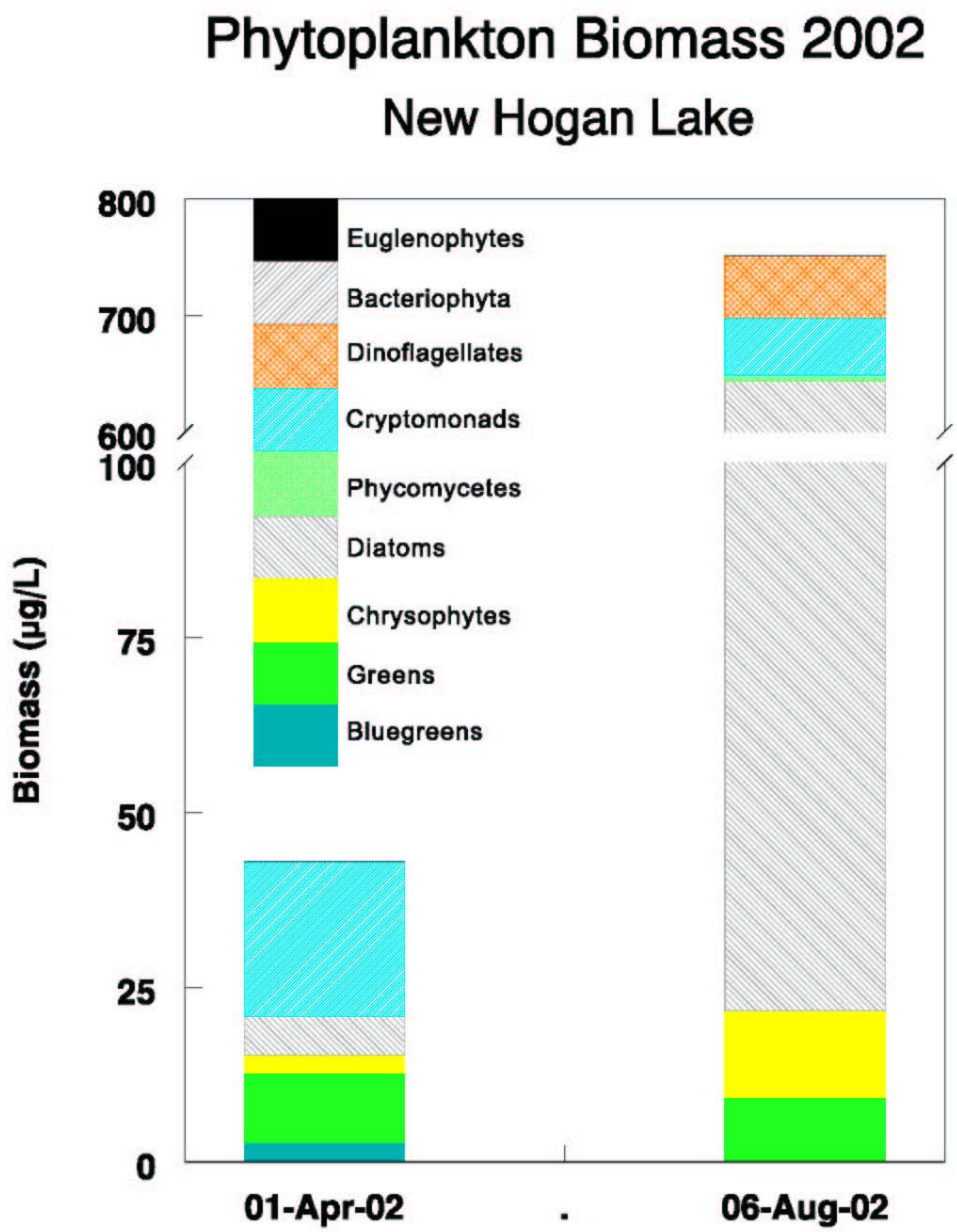


New Hogan Lake - pH Profile
Depth (Ft)
0
20
40
60
80
100
120
140
160
6
6.5
7
7.5
8
8.5
9
9.5
pH
April
August

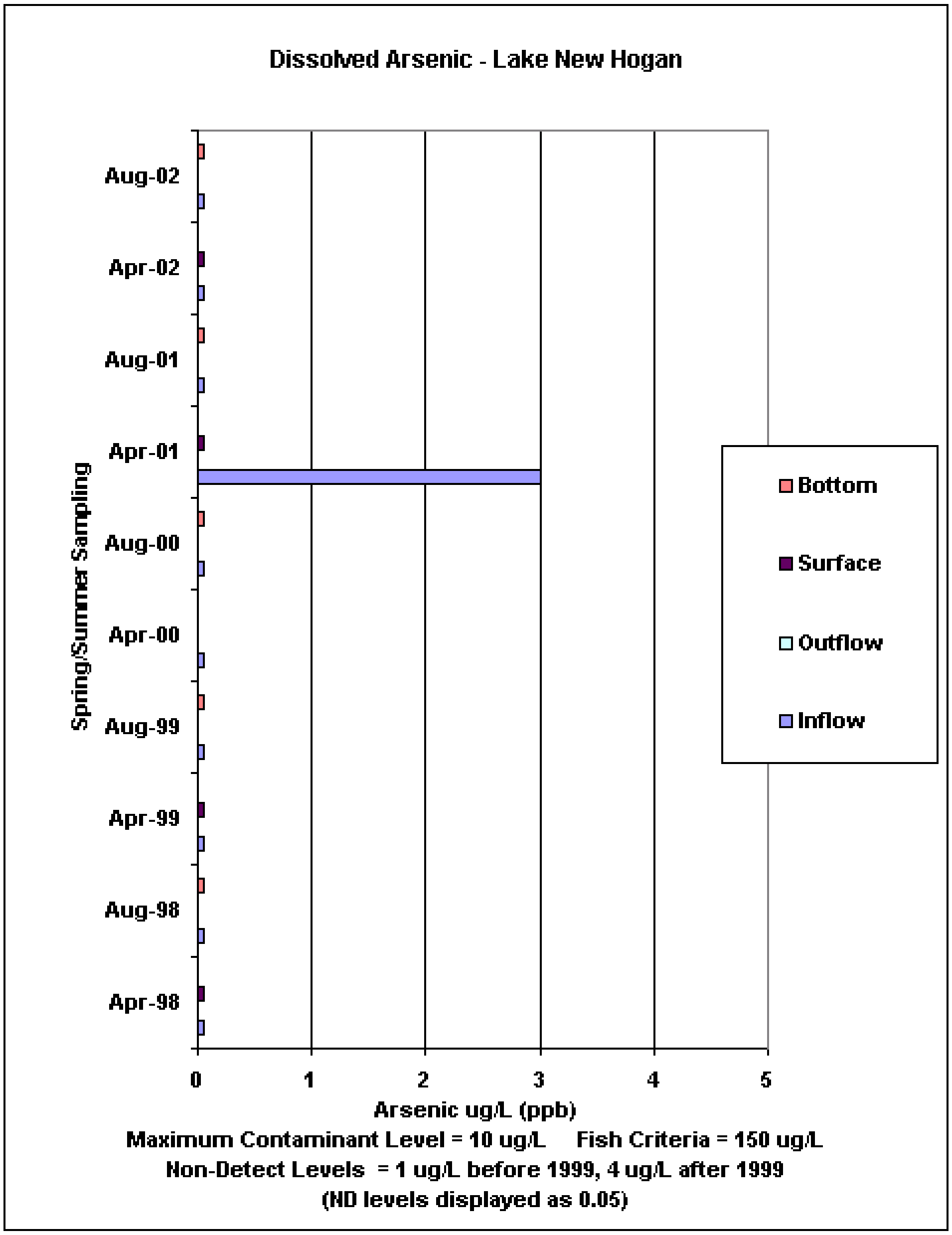
NEW HOGAN LAKE					
Sample Location: Behind dam				**Date:** 04/01/02	
Observers: Tim McLaughlin				**Time:** 9:40 am	
Lake Elevation: 676.1					
Weather Conditions:					
Wind Speed: 0		**Precipitation:** 0		**Temp (F):** 75	
SECCHI Depth: 22 feet and 6 inches					
Depth-M	**Depth-F**	**Temp-C**	**Cond**	**DOmg/L**	**pH**
38.1	124.7	8.60	152	6.6	7.12
36	118.1	8.90	154	8.00	7.16
34	111.5	8.90	152	8.50	7.18
32	105	8.90	153	8.60	7.18
30	98.4	9.10	154	8.70	7.20
28	91.9	9.30	153	9.40	7.18
26	885.3	9.40	154	9.40	7.19
24	78.7	9.30	154	9.10	7.20
22	72.2	9.60	153	9.20	7.21
20	65.6	9.80	153	9.40	7.21
18	59.1	10.00	153	9.70	7.24
16	52.5	10.20	154	9.80	7.24
14	45.9	10.40	154	10.10	7.31
12	39.4	10.80	154	10.20	7.32
10	32.8	11.50	152	10.40	7.26
8	26.2	12.20	153	10.60	7.26
6	19.7	13.10	154	10.70	7.26
4	13.1	15.70	154	10.10	7.26
2	6.6	16.10	154	10.30	7.26
0.03	1	16.40	154	10.73	7.25
CALAVERAS (Inflow)					
Temp (F)	**pH**		**DOmg/L**	**EC**	**Flow rate (cfs**
64	7.36		-	-	201
CALAVERAS (Outflow)					
Temp (F)	**pH**		**DOmg/L**	**EC**	**Flow rate (cfs**
-	-		-	-	-
VISUAL OBSERVATIONS:					

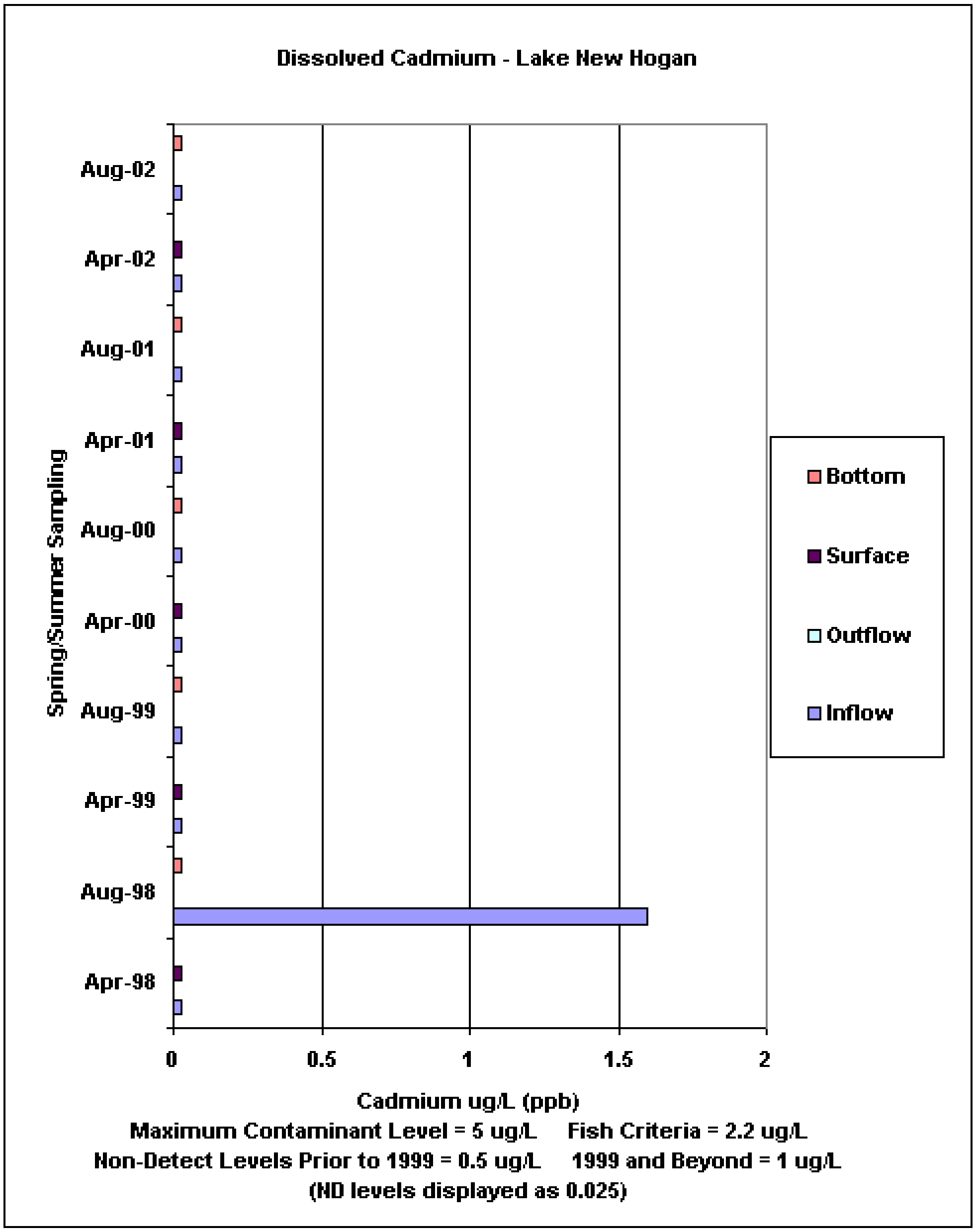
NEW HOGAN LAKE					
Sample Location: Behind dam				**Date:** 8/06/02	
Observers: Tim McLaughlin				**Time:** 10:00 am	
Lake Elevation: 664.67					
Weather Conditions:					
Wind Speed: 0		**Precipitation:** 0		**Temp (F):** 75	
SECCHI Depth: 15 feet and 6 inches					
Depth-M	**Depth-F**	**Temp-C**	**Cond**	**DOmg/ L**	**pH**
40.9	137.6	10.6	187	3.25	7.43
40	131.2	10.6	187	3.27	7.49
38	124.7	10.6	187	3.30	7.48
36	118.1	10.5	187	3.34	7.53
34	111.5	10.6	187	3.37	7.55
32	105	10.7	187	3.39	7.57
30	98.4	11.00	187	3.40	7.64
28	90.9	11.00	187	3.43	7.67
26	885.3	11.20	188	3.45	7.71
24	78.7	11.80	188	3.45	7.72
22	72.2	12.10	188	3.43	7.77
20	65.6	12.70	189	3.32	7.82
18	59.1	14.70	202	3.38	7.84
16	52.5	16.20	189	3.63	7.98
14	45.9	17.30	190	4.50	8.11
12	39.4	20.10	192	5.37	8.39
10	32.8	24.40	205	6.11	8.87
8	26.2	24.50	205	6.12	8.88
6	19.7	24.50	205	6.16	8.79
4	13.1	24.60	205	6.15	8.76
2	6.6	24.60	205	6.16	8.63
0.03	1	24.90	205	6.44	8.44
CALAVERAS (Inflow)					
Temp (F)	**pH**		**DOmg/ L**	**EC**	**Flow rate (cfs**
76.2	7.67		-	-	-
CALAVERAS (Outflow)					
Temp (F)	**pH**		**DOmg/ L**	**EC**	**Flow rate (cfs**
-	-		-	-	-
VISUAL OBSERVATIONS:					

Appendix C: Phytoplankton Data and Charts

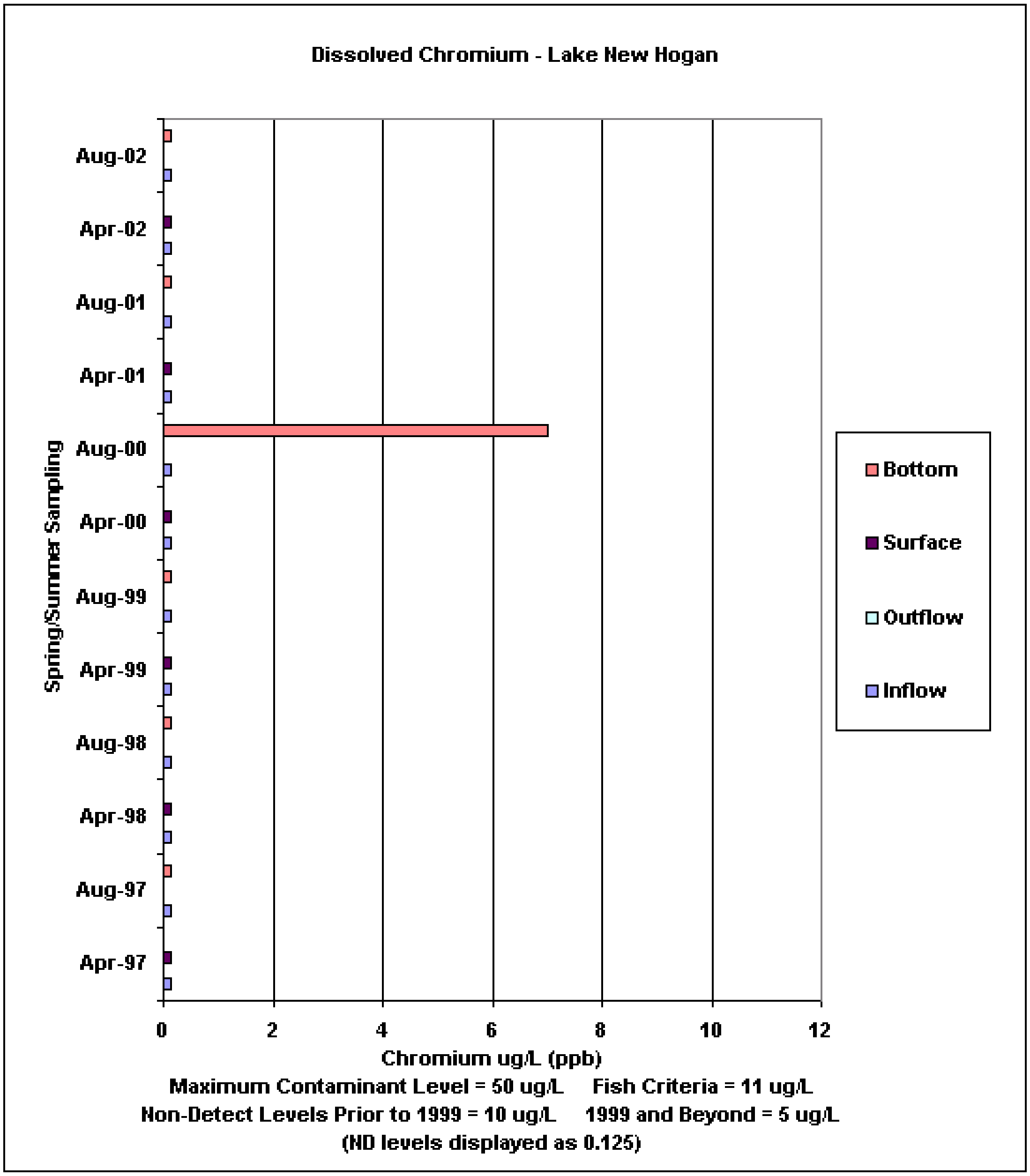

Phytoplankton Biomass 2002
New Hogan Lake
Biomass (µg/L)
800
700
600
100
75
50
25
0
Euglenophytes
Bacteriophyta
Dinoflagellates
Cryptomonads
Phycomycetes
Diatoms
Chrysophytes
Greens
Bluegreens
01-Apr-02
.
06-Aug-02

Appendix D: Metals Data and Charts

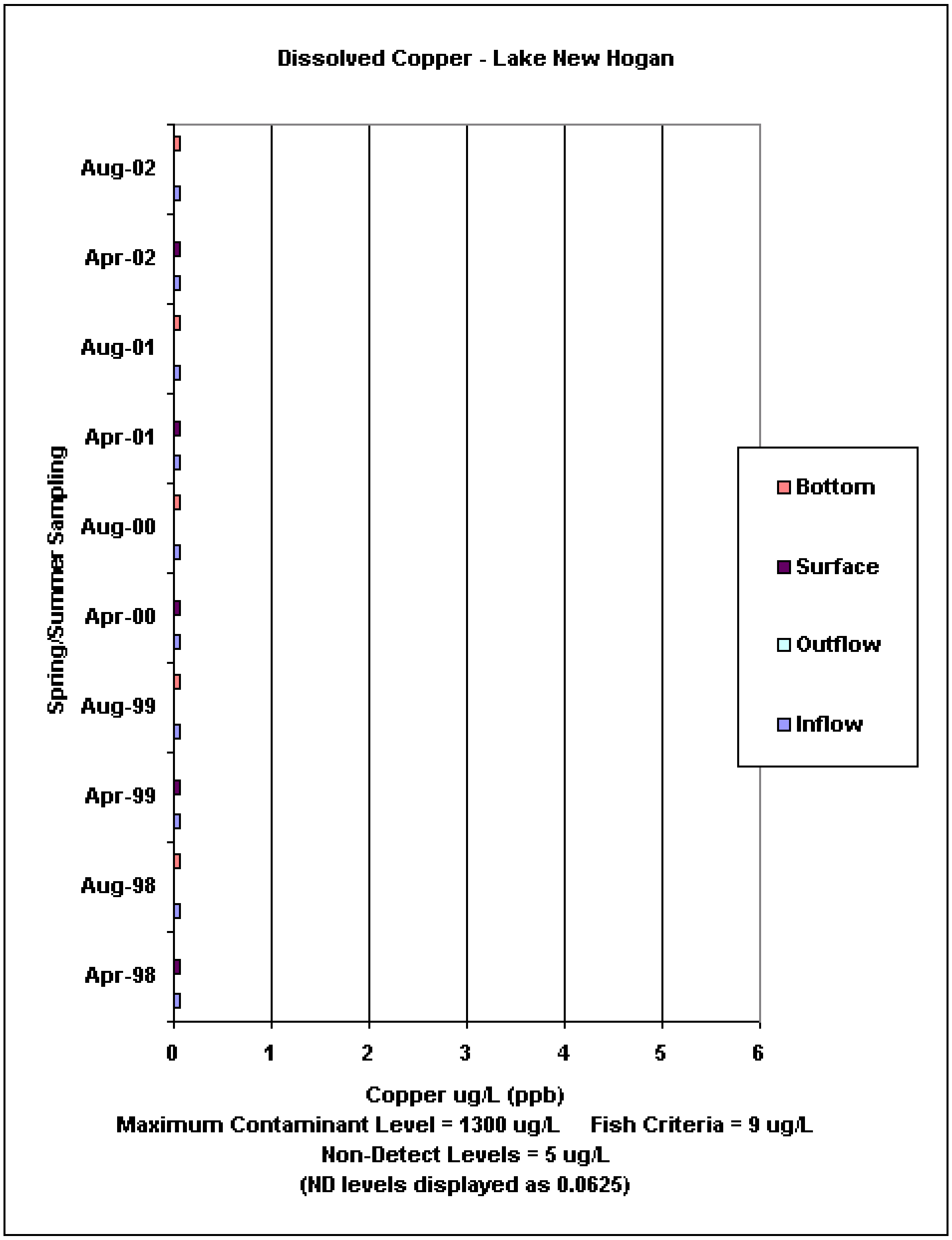

Dissolved Arsenic - Lake New Hogan
Aug-02
Apr-02
Aug-01
Apr-01
Aug-00
Apr-00
Aug-99
Apr-99
Aug-98
Apr-98
Spring/Summer Sampling
Bottom
Surface
Outflow
Inflow
0
1
2
3
4
5
Arsenic ug/L (ppb)
Maximum Contaminant Level = 10 ug/L   Fish Criteria = 150 ug/L
Non-Detect Levels = 1 ug/L before 1999, 4 ug/L after 1999
(ND levels displayed as 0.05)

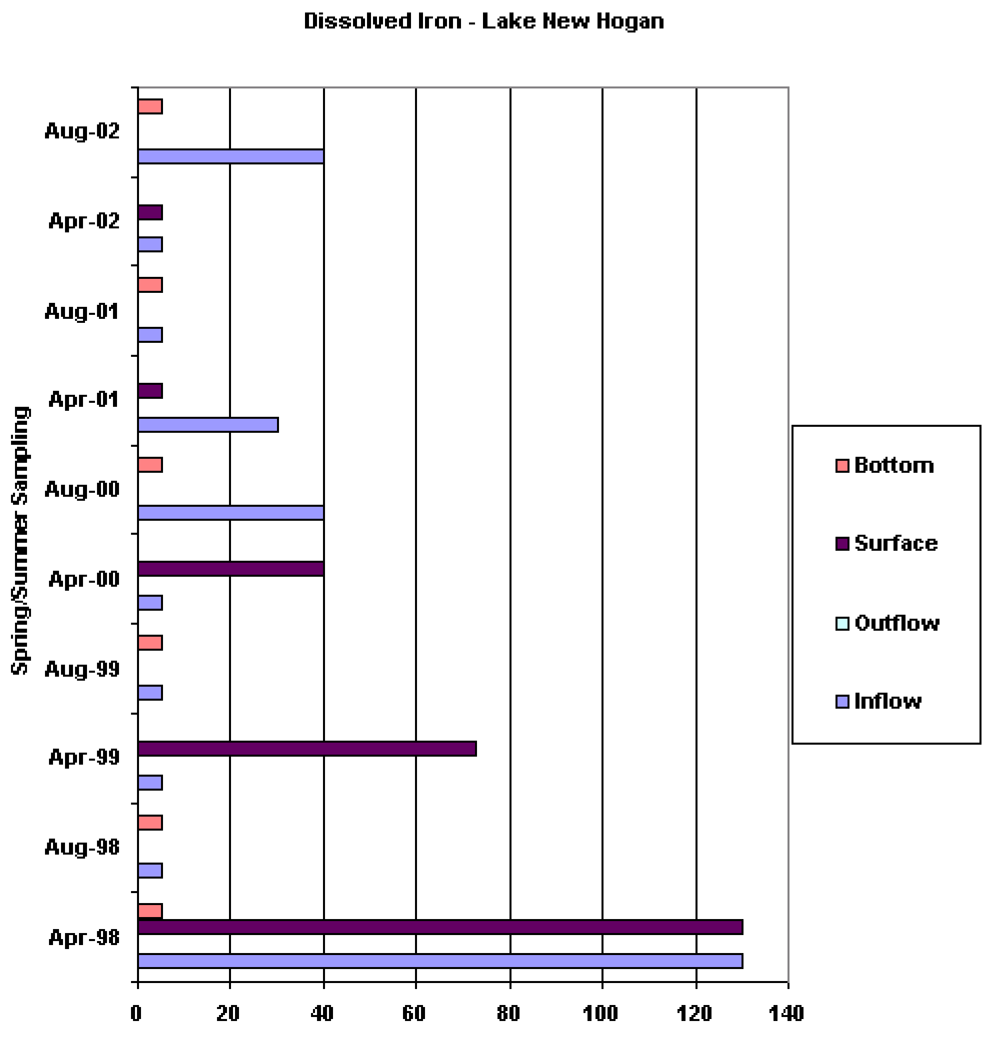


Dissolved Cadmium - Lake New Hogan
Spring/Summer Sampling
Aug-02
Apr-02
Aug-01
Apr-01
Aug-00
Apr-00
Aug-99
Apr-99
Aug-98
Apr-98
0
0.5
1
1.5
2
Bottom
Surface
Outflow
Inflow
Cadmium ug/L (ppb)
Maximum Contaminant Level = 5 ug/L   Fish Criteria = 2.2 ug/L
Non-Detect Levels Prior to 1999 = 0.5 ug/L   1999 and Beyond = 1 ug/L
(ND levels displayed as 0.025)

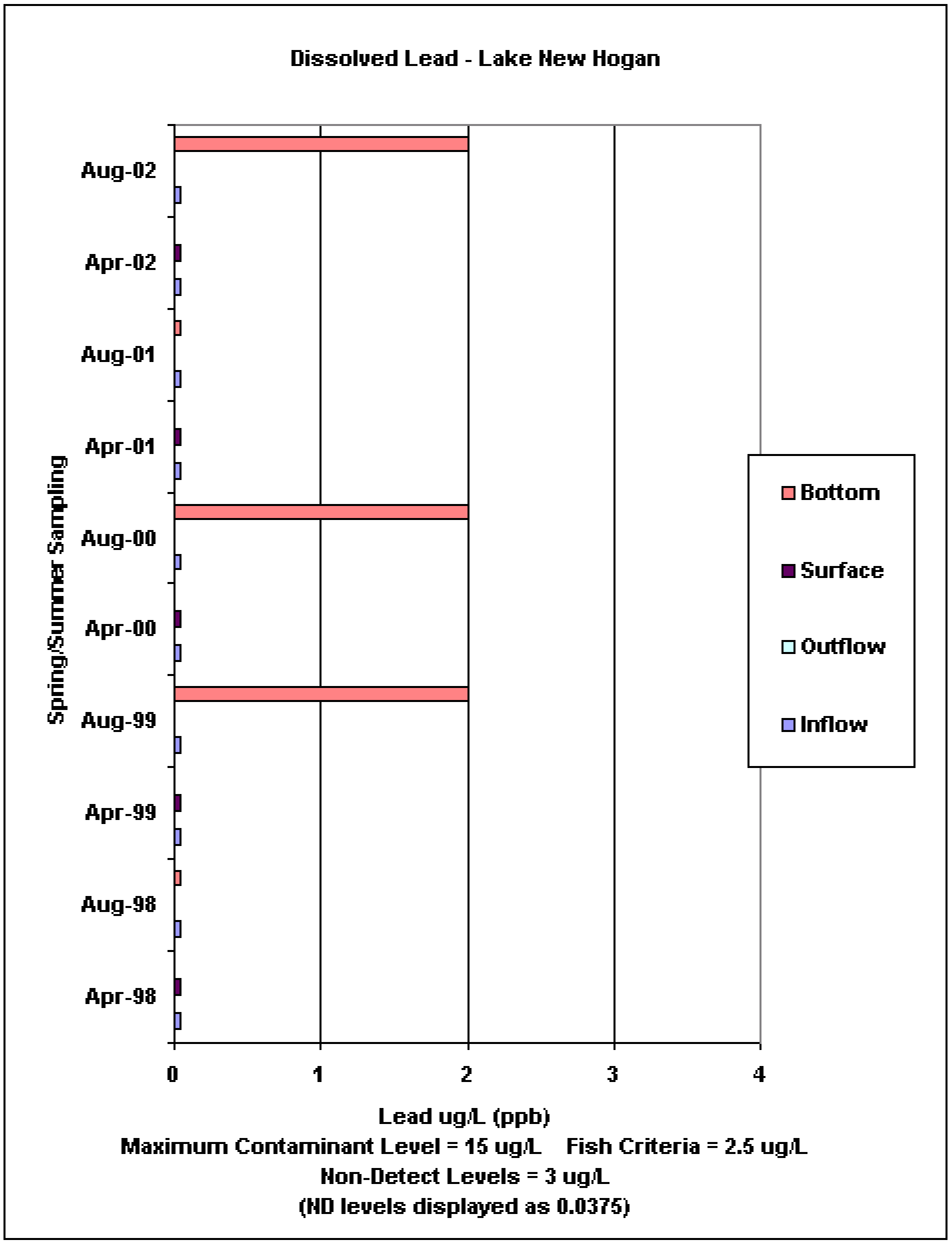


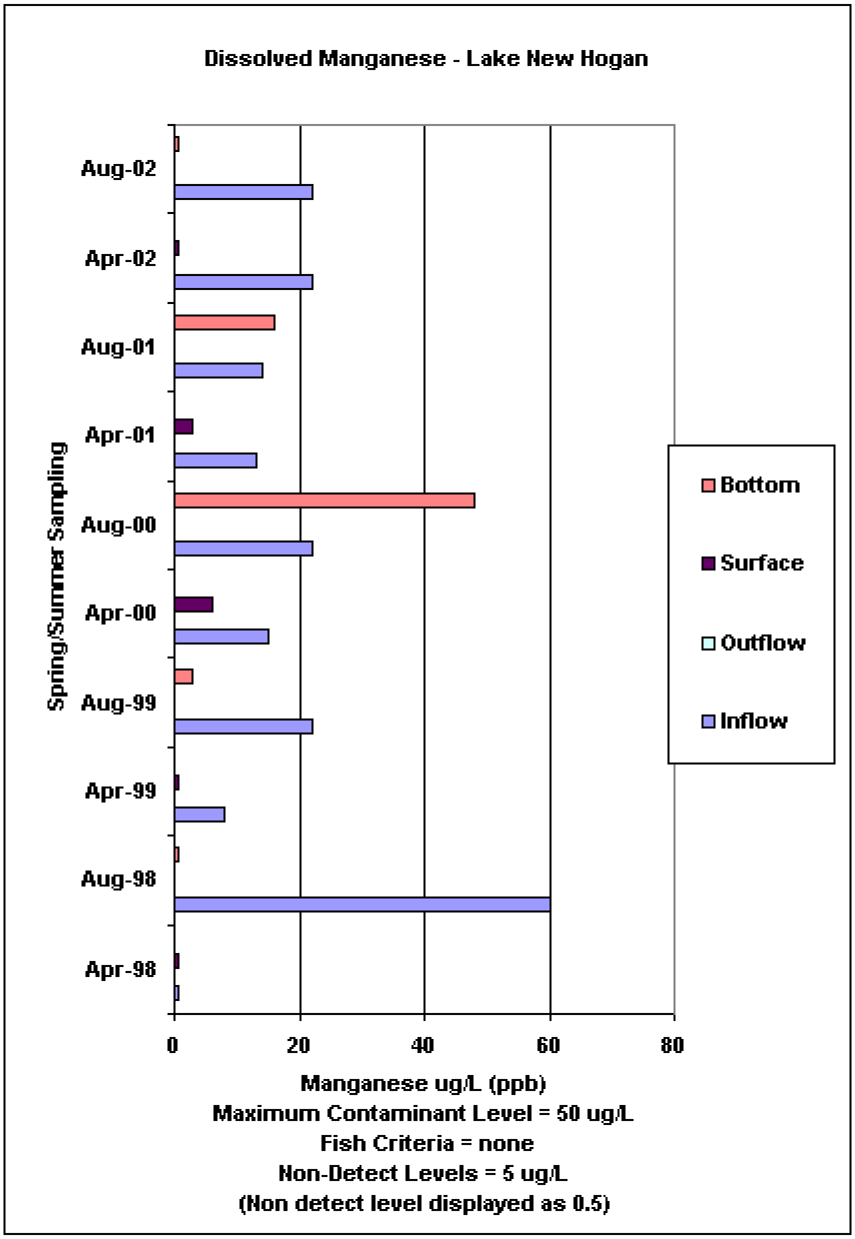
Dissolved Chromium - Lake New Hogan
Spring/Summer Sampling
Aug-02
Apr-02
Aug-01
Apr-01
Aug-00
Apr-00
Aug-99
Apr-99
Aug-98
Apr-98
Aug-97
Apr-97
0
2
4
6
8
10
12
Bottom
Surface
Outflow
Inflow
Chromium ug/L (ppb)
Maximum Contaminant Level = 50 ug/L Fish Criteria = 11 ug/L
Non-Detect Levels Prior to 1999 = 10 ug/L 1999 and Beyond = 5 ug/L
(ND levels displayed as 0.125)

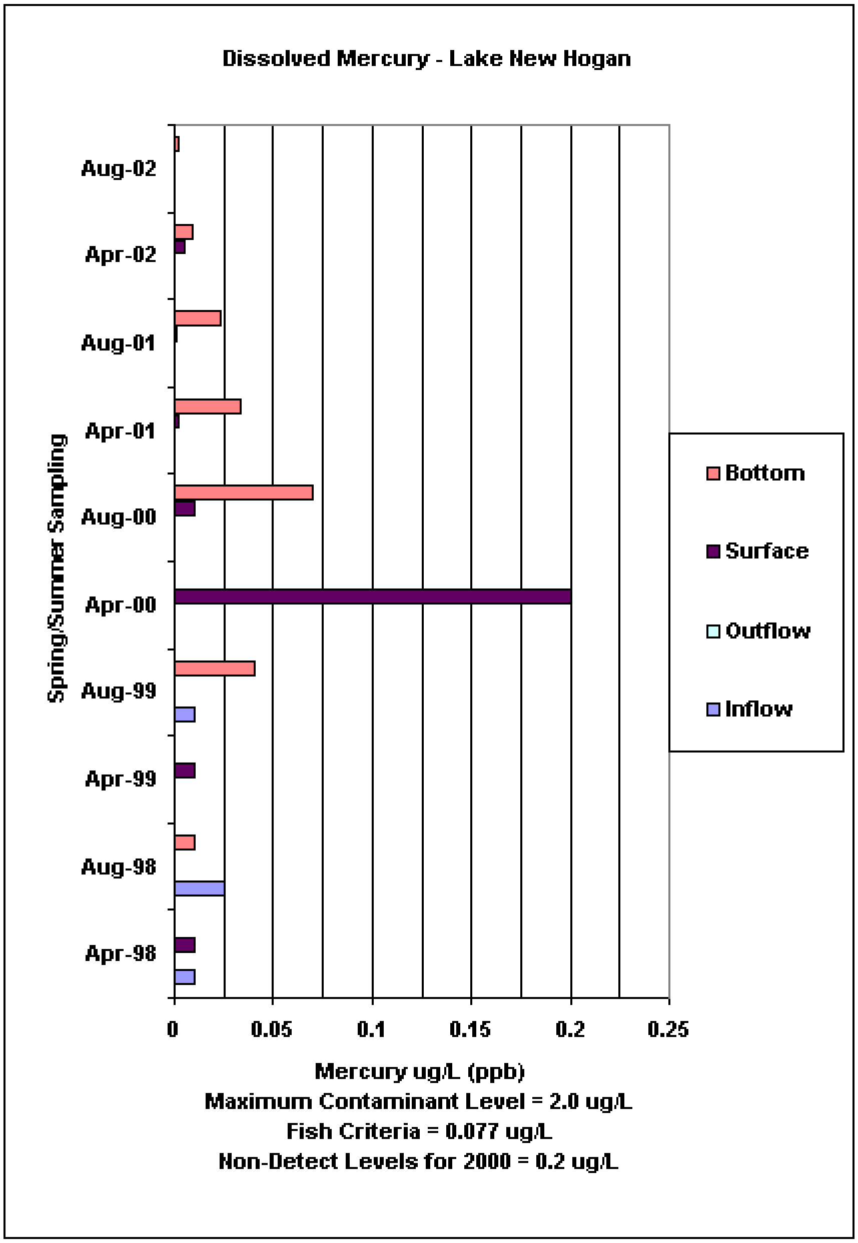

Dissolved Copper - Lake New Hogan
Aug-02
Apr-02
Aug-01
Apr-01
Aug-00
Apr-00
Aug-99
Apr-99
Aug-98
Apr-98
Spring/Summer Sampling
0
1
2
3
4
5
6
Bottom
Surface
Outflow
Inflow
Copper ug/L (ppb)
Maximum Contaminant Level = 1300 ug/L Fish Criteria = 9 ug/L
Non-Detect Levels = 5 ug/L
(ND levels displayed as 0.0625)

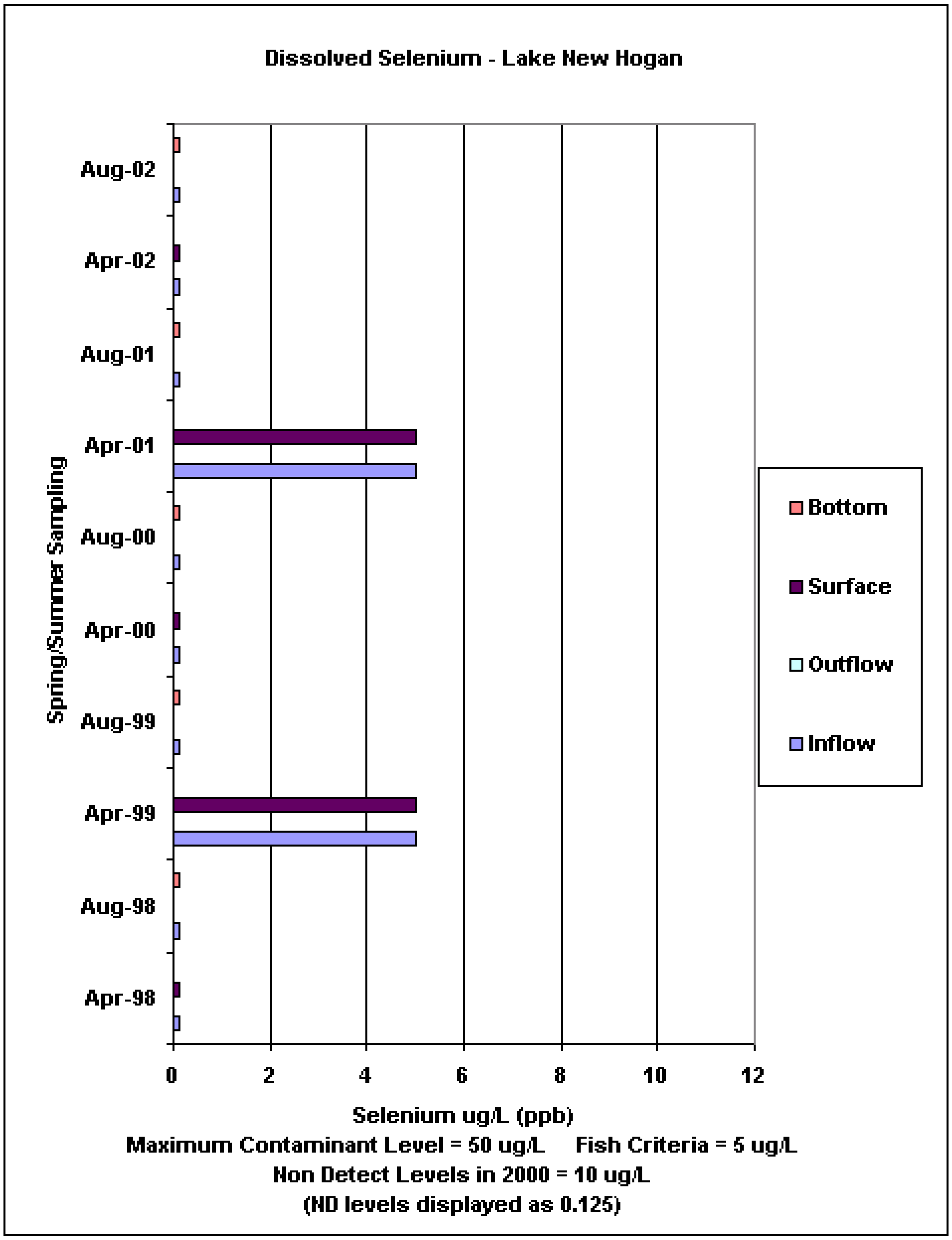


Maximum Contaminant Level = 300 ug/L   Fish Criteria = 1000 ug/L
Non-Detect Levels Prior to 1999 = 100 ug/L   1999 and Beyond = 50 ug/L
(ND levels displayed as 5)

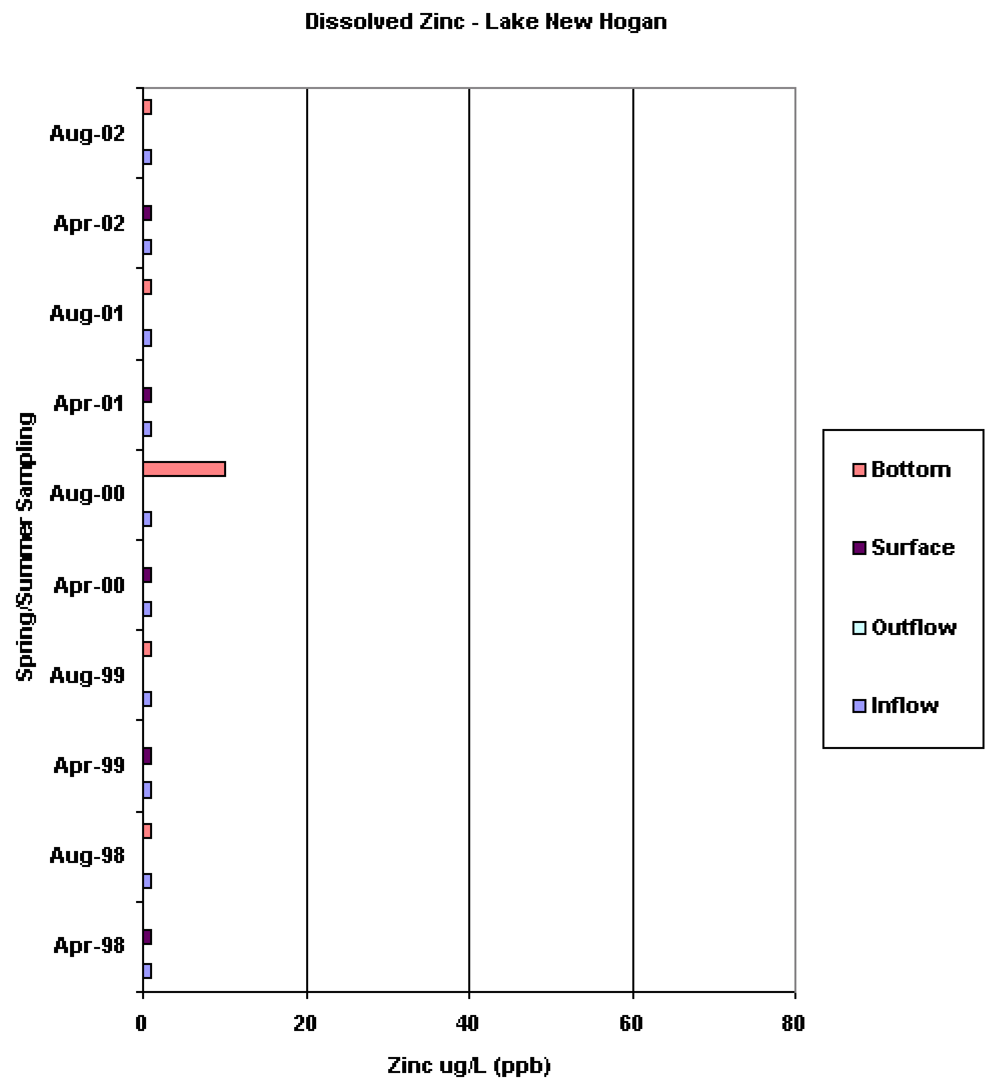

Dissolved Lead - Lake New Hogan
Spring/Summer Sampling
Aug-02
Apr-02
Aug-01
Apr-01
Aug-00
Apr-00
Aug-99
Apr-99
Aug-98
Apr-98
0
1
2
3
4
Bottom
Surface
Outflow
Inflow
Lead ug/L (ppb)
Maximum Contaminant Level = 15 ug/L Fish Criteria = 2.5 ug/L
Non-Detect Levels = 3 ug/L
(ND levels displayed as 0.0375)


Dissolved Manganese - Lake New Hogan
Spring/Summer Sampling
Aug-02
Apr-02
Aug-01
Apr-01
Aug-00
Apr-00
Aug-99
Apr-99
Aug-98
Apr-98
0
20
40
60
80
Bottom
Surface
Outflow
Inflow
Manganese ug/L (ppb)
Maximum Contaminant Level = 50 ug/L
Fish Criteria = none
Non-Detect Levels = 5 ug/L
(Non detect level displayed as 0.5)


Dissolved Mercury - Lake New Hogan
Spring/Summer Sampling
Aug-02
Apr-02
Aug-01
Apr-01
Aug-00
Apr-00
Aug-99
Apr-99
Aug-98
Apr-98
0
0.05
0.1
0.15
0.2
0.25
Bottom
Surface
Outflow
Inflow
Mercury ug/L (ppb)
Maximum Contaminant Level = 2.0 ug/L
Fish Criteria = 0.077 ug/L
Non-Detect Levels for 2000 = 0.2 ug/L



Dissolved Selenium - Lake New Hogan
Aug-02
Apr-02
Aug-01
Apr-01
Aug-00
Apr-00
Aug-99
Apr-99
Aug-98
Apr-98
Spring/Summer Sampling
0
2
4
6
8
10
12
Bottom
Surface
Outflow
Inflow
Selenium ug/L (ppb)
Maximum Contaminant Level = 50 ug/L Fish Criteria = 5 ug/L
Non Detect Levels in 2000 = 10 ug/L
(ND levels displayed as 0.125)



Maximum Contaminant Level = 5000 ug/L   Fish Criteria = 120 ug/L
Non-Detect Levels Prior to 1999 = 100 ug/L   1999 and Beyond = 20 ug/L
(ND levels displayed as 1.0)

Appendix E: Inorganic Sample Data

Inorganic Results (mg/L) For surface lake waters (spring)												
	BB	EA	EN	HE	IS	KA	MC	ME	NH	PF	SO	SU
Alkalinity		60	40	50	60	30	40	70	80	20		100
Ammonia		<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
Chloride		21	2	21	4	4	3	<1	6	5		4
Nitrate		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1		<0.1
Total P		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
Ortho P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1
Sulfate		5.3	2.6	4.2	8.9	2	1	8.2	9	2.1		4.7
Kjeldahl N		0.6	0.1	0.4	0.2	<0.1	0.3	0.2	0.2	0.2		<0.1
COD					<50							
Tot Solids		120	70	100	110	60	78	100	120	21		150

Inorganic Results (mg/L) For inlet waters to the lakes (spring) (I-1 only)												
	BB	EA	EN	HE	IS	KA	MC	ME	NH	PF	SO	SU
Alkalinity	100	70	40	50	20	30	40	80	90	10	100	50
Ammonia	<0.1	<0.1	<0.1	<0.1	<0.1		0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chloride	13	25	3	21	<1	<1	4	<1	6	4	3	2
Nitrate	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1
Total P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ortho P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	
Sulfate	18	2.1	2.3	3	2.8	1.9	0.8	8.8	11	1.6	11	3.5
Kjeldahl N	<0.1	0.2	<0.1	0.3	<0.1	<0.1	0.2	0.2	0.1	0.1	0.1	<0.1
COD	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Tot Solids	170	130	59	110	60	60	90	110	150	30	130	90

Inorganic Results (mg/L) For surface lake waters (summer)												
	BB	EA	EN	HE	IS	KA	MC	ME	NH	PF	SO	SU
Alkalinity	140	70	40	50	50	40	70	90	80	10	80	110
Ammonia	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	0.1	<0.1
Chloride	16	26	4	19	6	5	5	5	9	3	5	8
Nitrate	<0.1	1.5	<0.1	1.3	0.7	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.1
Total P	<0.1	0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ortho P	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfate	16	4.1	3.6	3.5	5.9	2	0.7	7.4	14	1.6	6.4	4.4
Kjeldahl N	<0.1	2.7	<0.1	0.4	0.4	0.3	<0.1	0.2	<0.1	<0.1	0.2	0.6
COD	<50	60	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Tot Solids	200	190	50	120	98	80	80	120	120	52	100	170

Inorganic Results (mg/L) For inlet waters to the lakes (summer) (I-1 only)												
	BB	EA	EN	HE	IS	KA	MC	ME	NH	PF	SO	SU
Alkalinity	150	90	40		60	40	80	100	130	20	110	180
Ammonia												
Chloride	16	490	5		10	8	3	5	14	4	5	22
Nitrate												
Total P												
Ortho P												
Sulfate	16	4.5	3		9.8	3.2	<0.5	6	14	2.7	5.4	8.7
Kjeldahl N												
COD												
Tot Solids	200	1300	50		140	100	100	150	200	50	140	280

Appendix F: MTBE Table

2002 MTBE Results
Units are ug/L (ppb)

The following table provides an overview of the lab results for the 2002 MTBE monitoring program.

Lake	Spring S	Spring S-1	Spring S-M	Spring S-C	Summer S	Summer S-1	Summer S-M	Summer S-C	Remarks
Black Butte	2		2		<2		<2		
Eastman	5				<2				
Englebright	3		3		10		10	10	
Hensley	3		3		3		3		
Isabella	<2	<2	<2	<2	<2	<2	<2	<2	
Kaweah	2		2	<2	8		6	6	
Martis Cr.	<2				<2				
Mendocino	<2				<2				
New Hogan	<2				3				
Pine Flat	<2		<2		2		2		
Sonoma		3	<2		<2		2		
Success	4		4	4	11	12	11	11	

Notes:

1. Non-Detect is indicated by "<2" since the Reporting Limit is 2 ppb or 0.002 ppm.

2. No enforceable acceptance criteria has been established for MTBE. See EPA Fact sheet.

3. Maps are provided to illustrate the sampling locations for samples: S / S-1, S-M, and S-C. Sample S and sample S1 are located near the dam; sample S-M is located within 50 ft of the Marina; and sample S-C is located near the center of the lake.

4. For 2002, the number of MTBE water sampling at each lake is based on last year's lab results.

5. 2 samples were taken from Eastman, Martis Creek, Mendocino, and New Hogan because MTBE was historically non-detectable. The 2002 results of non-detectable levels were similar except Lake Eastman and New Hogan now reported low, detectable levels of MTBE.

6. 4 samples were taken from Black Butte, Hensley, Pine Flat and Sonoma because of historically low detectable levels of MTBE.

7. 6 to 8 samples were taken from Englebright, Isabella, Kaweah and Success because of historically higher MTBE being found. The 2002 results were similar except Isabella now reported non-detectible levels.

8. In 2001, very high MTBE levels were reported at Lake Isabella during the Spring (18 ug/L near the marina) . During Spring 2000, Lake Isabella reported 21 ug/L. The 2002 results indicate that the previous MTBE problem near the marina was not visible during the Spring 2002 sampling event, and may have been rectified.

Appendix G: Fish Tissue Analysis Table

2002 Fish Tissue Results

The following table provides an overview of the lab results for the 2002 fish tissue program. N/A indicates data is not available due to lack of fish collection. Sample Preparation, filleting and Extraction were in accordance with EPA 823-R-95-007, Sep 95, Volume 1, Section 7.2 (Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisory) which requires the following: Only the edible portion of the fillet shall be analyzed (i.e no skin, tail, fin, head). Tissue digestion shall be accomplished by adding concentrated nitric acid and heating the tube in an aluminum block to reflux the acid. The digestate shall be cooled, diluted to a final volume of 25 ml and analyzed by CVAA. The laboratory conducting the preparation and analysis was Toxscan, Inc in Watsonville, CA and the laboratory mercury analysis was in accordance with CVAA per EPA 7471. The Percent Lipids were per EPA 1664. The FDA criteria for a fish advisory is 1 ppm. The California OEHHA's action level to continue fish tissue monitoring is 0.3 ppm.

Lake	Type of Fish	Type of Analysis (number of fish)	Date collected	Percent Lipids	Mercury Total ppm	FDA Criteria
Black Butte	Sm M Bass	Composite (3)	6/12/02	0.24	0.26	1 ppm
Eastman	Note 4	--------------------	-----------	----------	-----------	< Mon 00
Englebright	Note 5	N/A	N/A	N/A	N/A	
Hensley	Black Bass	Composite (3)	4/23/02	<0.10	0.72	1 ppm
Isabella	Black Bass	Composite (3)	6/4/02	0.20	0.21	1 ppm
Kaweah	Sm M Bass	Composite (3)	7/14/02	0.11	0.53	1 ppm
Martis Cr	Note 4	--------------------	-----------	----------	-----------	< Mon 00
Mendocino	Note 6	N/A	N/A	N/A	N/A	
New Hogan	Lg M Bass	Single (1)	6/3/02	<0.10	0.34	1 ppm
Pine Flat	Note 4	--------------------	-----------	----------	-----------	< Mon 01
Sonoma	Note 6	N/A	N/A	N/A	N/A	
Success	Black Bass	Composite (3)	4/15/02	<0.10	0.18	1 ppm

Notes:

9. Non-Detect is indicated by "<0.02". The lab Detection Limit for mercury is 0.02 ppm.
10. Total Mercury was reported in mg/g or ppm.
11. Total Mercury was conducted instead of Methyl Mercury since EPA 832 allows Total Mercury analysis for an initial screening program. When specific problem areas are identified, methyl mercury analysis are normally performed later as part of the actual health risk assessment.
12. The fish tissue program was terminated at Eastman and Martis Creek in 2001 and in Pine Flat in 2002 due to low total mercury results. In 2000, the total mercury was only 0.089 ppm for Eastman (Catfish) and the total mercury was <0.02 ppm for Martis Creek (Brown Trout). For Pine Flat total mercury was 0.21 ppm in 2000 (composite of three Sacramento Sucker fish) and 0.23 in 2001 (composite of three spotted bass).

13. Due to seasonal conditions, a fish could not be successfully collected at Lake Englebright. Another attempt will be accomplished for the 2003 report.
14. Fish were not collected at Mendocino or Sonoma due to communication difficulties.

The above 2002 total mercury results indicate only Hensley is higher than average. However, in 2001, the total mercury results were only 0.30 ppm for Hensley (small mouth bass). The 2003 fish tissue program should provide additional data. EPA fact sheet on fish advisories (EPA-823-F-99-016) indicates that the mean average mercury results from numerous lakes in the Northeast United States were found to be 0.46-0.51 ppm for largemouth bass and 0.34-0.53 for smallmouth bass.